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ABSTRACT

The CLASS (Communication, Learning, and Assessment in a Student-centered System) Project is creating a complete, accredited, high school sequence for delivery on the World Wide Web. The Department of Distance Education of the University of Nebraska-Lincoln (UNL) is a recipient of $18 million in federal funding to develop the sequence. When completed in 2001, CLASS will offer students 54 courses from which to choose to complete these requirements. The CLASS instructional design model enables input from a variety of sources and empowers the designers with constant feedback. The model includes the following steps: identify the need; assemble the content development team; research; brainstorm; assign personnel; ascertain resources; create a proposal; create the course; and test the course. CLASS instructional features give distance education students the opportunity to learn using a myriad of learning tools that are unique to Web-based distance education, including student-to-student communication, dynamic learning activities, student-selected learning paths, multimedia-reinforced learning, self-monitoring of progress, and the ability to create multimedia portfolios, all in a seamless learning environment not bound by time or space. (DLS)

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The CLASS Course Design Model for Web-Based Instruction

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Introduction

The CLASS (Communication, Learning, and Assessment in a Student-centered System) Project is creating an accredited high school sequence for delivery on the World Wide Web. Because the Web offers an unique distance learning environment, the CLASS Project has developed an instructional design model specifically for the Web. Coupled with the instructional design model, CLASS has created Web-based instructional design features to maximize the learning opportunities afforded by this electronic education environment. Both the CLASS design features and instructional design model are transferable and scaleable to the needs of other distance education programs.

The Project

The CLASS Project's goal is to make available on the World Wide Web a complete, accredited, high school diploma sequence. The Department of Distance Education of the University of Nebraska-Lincoln (UNL) is recipient of $18 million in federal funding to develop the sequence. When completed in 2001, CLASS will have available to students 54 courses from which to choose to complete these requirements.

The Department of Distance Education is uniquely suited to provide this diploma sequence. Among its units is the Independent Study High School (ISHS). The ISHS is the only university-based, fully accredited, independent study high school in the United States. In operation since 1929 and accredited by both the North Central Association of Colleges and Schools and the Nebraska Department of Education (NDE), the ISHS currently serves about 15,000 students annually in 136 countries. The students can choose among 138 print-based courses in addition to the electronic courses. Enrollment is open, with students registering throughout the year.

The uniqueness and long record of success of the ISHS was recognized by various government funding sources. Beginning in March, 1996, the first funding for the CLASS Project was awarded for proof of concept by the federal General Services Administration. In July, 1996, the ISHS was notified that it had been awarded a Star Schools grant. This was a five year win with first year funding, beginning October 1, 1996. Other funds for the technology invention side of the project came from various components of the United States' service community, including the Central Intelligence Agency and the National Reconnaissance Office.

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The Courses

The development of the courses for this project required the recognition of several factors. Paramount among these was the World Wide Web offered a new and different educational delivery method. Therefore, current print-based courses could not simply be transferred to the Web. Second, in order to fully utilize the potential of the Web as an educational delivery system there would need to be new software and technologies developed. Third, and premised on the first two points, production of these courses would take place in a manner different than traditional multimedia production. To put it simply, the project would require invention in both the areas of instructional design and technology.

CLASS is a dynamically interactive, student-centered course environment delivered electronically via the World Wide Web. Students access moving imagery, graphics, sound, and text within a seamless navigational system that encourages individualized learning, discovery and exploration. "Seamless" means that students do not have to open and close applications to move from-for instance-a text screen to simulation (or to a video or discussion group). The technology for supporting all the media of a course is included in CLASS.

CLASS provides new avenues of educational access through cost-effective alternatives to conventional classroom teaching situations. These new avenues are particularly important when reaching out to all levels of students, including nontraditional, geographically isolated or disadvantaged segments of the population, at-risk and the gifted.

CLASS provides individual learners with access to interactive, flexible course materials, including data, graphics and video, and incorporates electronic interaction between learners and instructors. CLASS helps students manage this multitude of materials by providing an electronic "notebook" where students can store and sort everything from video to text. They can share this information with other students or with the teacher.

Courses are formatted especially for electronic delivery. Students are responsible for their own learning, making choices in the paths they take through course units, and selecting from many different learning activities and experiences. Units develop increasing levels of complexity and sophistication within the course content. As students move through the course, their interaction with the materials requires an ever-widening understanding of the concepts being presented.

Students determine their own mastery of the material by taking practice exams that are electronically evaluated, students receive the results in only a few seconds. Examinations and projects are evaluated electronically or by the teacher.

CLASS instructional design provides for interaction between learners and instructors, stressing the development of life and workplace skills, citizenship responsibilities and critical thinking. New technologies provide learners with access to digital libraries from national, historic, scientific and research centers over the global and national information infrastructure.

Instructional Design Model

The CLASS instructional design model was created for efficacious incorporation of input from a wide variety of sources, as well as meeting the evaluation needs of the Star Schools grant. Each course in development follows a similar instructional design sequence. Each course is also unique, requiring varying levels of input from different individuals and groups, depending upon the content, content treatment, timeline, budget, members on the team and their particular expertise. Below is a discussion of the CLASS course instructional design model.

Identify Need

Instructional design for a Web-based distance education course begins with identifying the need. What course will be created, and for whom? Each demographic characteristic of the target student helps define what content should be taught and how it should be taught. From the onset, CLASS tailors instructional design for specific target learner needs, including adult, rural, inner-city, isolated, at-risk, home schooled, home bound, grade level, achievement level and learning profiles. Understanding the target student is critical to many decisions made later during the instructional design process.

Assemble Team

Being able to define the target student empowers decision making when assembling the content development team. CLASS content development teams are supervised by an Instruction Design Specialist (IDS). The IDS is responsible for overseeing all phases of instructional design and assembles a team that includes a(n):

- Teacher who ensures the instructional design meets the needs of the ISHS.
- NDE representative who ensures the instructional design meets state frameworks and national standards.
- Nebraska Center for Instructional Innovation (CII) representative who ensures the instructional design is founded in sound educational psychology.
- Nebraska Educational Telecommunications (NET) Multimedia Project Manager who ensures the instructional design is doable, and then supervises the production of the Web pages.
- UNL faculty representative who provides content area expertise.
- Subject matter expert(s) who writes the content text for the course.

Frequently, other people contribute to the development of content. High school students and teachers, and at-risk education experts provide valuable insight on how to meet the needs of the students targeted for the Star Schools grant. Instructional Designers (ID) help with all facets of the course development process, including editing, storyboarding the course and Alpha review. The content development team is primarily involved in research, conceptual brainstorming, designing a proposal, and writing content.

Research

During the research phase of the CLASS instructional design process, the course development team surveys the state frameworks, national standards, applicable learning theory and existing content sources. The course development team reviews course specific

CD-ROMs, videos, audios, textbooks, other print sources, Web sites and pre-existing ISHS print courses. If the team decides to utilize the assets of an existing content source, the CLASS Contracts Specialist is notified, initiating the permissions process. Equally important as to what content is taught is how the content is taught. The content development team also analyzes and selects applicable learning theory, e.g. for an English course the team might want to consider 6-Trait Writing Process, Whole Language, Great Works, whole texts, descriptive grammar, generative grammar, language acquisitions processes, authentic assessments, and behavioral objectives, as well as the independent learner model and constructivist theory.

Brainstorm

After gathering information, the content development team brainstorms what will be taught-content, and how it will be taught-content treatment. When formulating content, the team considers questions such as:

- How will the student acquire knowledge?
- How will the student demonstrate mastery?
- What outcomes will the student achieve?
- What skills will the student practice?
- What processes will the student be able to transfer from this course to his or her next level of involvement with the subject area?
- What processes will the student be able to transfer from this course to other content areas?
- What life skills will the student acquire from the course?
- What level of independence is expected of a student completing the course?

When designing the content treatment, the team considers the following things:

- What teaching strategies will be used?
- Will the content be delivered via metaphor? If so, what is the most appropriate metaphor?
- What assessment strategies should be used-computer graded, multimedia portfolios, written projects?
- How much teacher time per student should be planned?
- How will the Web-based learning environment affect student learning, e.g. delivery time, tone of metaphor, text and graphics?
- How is Web-based distance education different from and similar to print-based distance education?
- How is Web-based distance education different from and similar to classroom education?

Answers to the above information is collated into a storyboard of what will be taught, how it will be taught and how it will appear in Web pages.

Assign Personnel

After storyboarding the content and its treatment, personnel are assigned to achieve specific tasks. The subject matter expert(s) is chosen to write the course text. The IDS and ID work closely with the subject matter expert(s), designing the Web page look, metaphor, activities

and assessments. Other content development team members review the course text and perhaps help revise. NET begins to develop the look and interface for the course. Time and expertise are key variables when selecting personnel roles.

Ascertain Resources

At this time, the Contracts Specialist works on ascertaining resources as identified by the content development team. Working within predetermined use fee limits and budget parameters, the Contracts Specialist determines copyright issues and permissions procedures, and then acquires permissions.

Create Proposal

Before the actual writing of the course, a proposal is created and presented to an external team. The proposal specifies the course to be developed, describes the target student group, lists learning outcomes or objectives and conceptually describes the content treatment, including media options, diversity, special needs, tracking and teacher role. Additionally, the proposal describes resources surveyed and sought for inclusion, describes the units and lists assessments. The course navigation is specified via a flowchart or storyboard. The proposal also identifies specific beta course feature testing issues and the beta evaluation process. Last, the proposal defines support needs, including course development personnel time, expenses and future course maintenance demands.

Create Course

After successful review of the proposal, the content development team focuses their energy on producing all facets of the course. The complete text of the course is written, in addition to descriptions of the navigation, text, multimedia, external links, internal links and communication. Once two units are written, revised and edited, NET begins building the course in Web pages.

Test the Course

Upon completion, the course goes through Alpha test, where all aspects of the course are subjected to a test run by the IDS and ID. Necessary changes are identified and made before Beta testing. During Beta testing, CII oversees the usage of the CLASS course by ISHS teachers, students from the target group and external instructional design experts. After Alpha and Beta testing, the first version of the course is made available for enrollment.

Instructional Design Features

Founded in constructivist learning theory, the CLASS courses utilize interactive designs and student-centered learning activities to facilitate student exploration and discovery. The seamless design enables ongoing self-checks, evaluation and assessment, which empowers students to interact with the courses in sequences or patterns that match his or her learning styles.

In addition to the Web-based instruction, learning in each CLASS course is supplemented by an ISHS or site-based teacher. Embedded within each course toolbar is an e-mail link to the teacher who quickly answers questions. Each course also includes a news group where the

teacher may post general announcements or moderate discussion about course related topics.

Student-to-student collaboration is also featured in CLASS courses. Writing students develop their peer critiquing techniques. Other students build multimedia projects together right on the Web.

Each course includes a Web-based "Notebook" where students can take computer-graded objective assessments, write essays and design multimedia portfolios. Students can add graphics to their assignments simply by dragging and dropping them into their notebooks, including audio and video files. The students' notebooks are privilege access secured on a CLASS server, and the students may revisit their assignments before publishing them to their teachers.

CLASS courses are reaching to utilize the Web to its fullest instructional advantage. Content is written specifically for the Web, scaffolded for broader and deeper experiences with the subject matter, and designed so the student has choices of direction and activity. Integral to the CLASS learning environment is wide use of audio and video. Original audio and video files, such as student testimonials about learning strategies in the *Learning FUNdaMENTALs* course and refugees discussing their experiences during the Bosnian conflict in the *Bosnia: Global Perspectives* course, produce an inclusive learning environment. Animated tutorials and interactive self-checks provide modal learning experiences. In *Geometry in Our World*, students interact with a tutorial on how to measure the area of a circle. In *Bosnia: Global Perspectives*, students study geography using drag and drop maps. In fact, each CLASS course illustrates yet another learning method enabled by the dynamic, multimedia capabilities of the Web. And each course is full of World Wide Web links to enhance and reinforce learning.

All new CLASS courses are developed utilizing a toolbar that has a standard look and functionality, easing the student learning curve from one course to another. In addition to using the toolbar, the student has a variety of navigational tools. The student can access course content via layered graphical maps, a course outline or embedded navigational prompts, which include directions that help the student maintain a sense of place.

The opening page or splash screen includes fast links to a variety of important information. A *Netscape for New Users* section helps the inexperienced or reluctant computer user become familiar with the Web learning environment. The *Help* and *Course Guide* sections provide the student with course specific learning strategies and answers to user-related questions. An *Introduction* orients the student toward their expected experiences and outcomes.

The *Grade Report* gives the student and teacher the opportunity to monitor progress. Password secured, the *Grade Report* displays a complete list of course assignments, grades for completed assignments and an accumulated grade.

A commitment to instructional design features using new, relevant technologies as they become available helps make CLASS courses possible for common operating PC or Macintosh systems on standard, multimedia capable, personal computers. And all major resources are cached on a CD-ROM, supplementing the advantages of Web-based delivery by ensuring expedient uploading.

Conclusion

The CLASS instructional design model is a work in progress, regularly revisited and revised. It is used for developing all CLASS courses and easily transfers to a variety of Web-based instructional needs. Whether one is developing a single lesson tutorial or an accredited semester-length course, the CLASS instructional model is sizable to the situation. This instructional design model enables input from a variety of sources, and empowers the designers with feedback before, during and after the process.

CLASS instructional features give distance education students the opportunity to learn using a myriad of learning tools that are unique to Web-based distance education, including student-to-student communication, dynamic learning activities, student-selected learning paths, multimedia-reinforced learning, self-monitoring of progress and the ability to create multimedia portfolios, all in a seamless learning environment not bound by time nor space.

Because of its size and scope, the CLASS Project has the potential to revolutionize the distance delivery of courses to individual students, learning centers and schools that cannot afford or do not have the ability to offer specialized courses such as *English as a Second Language*.

Currently ten courses are open for enrollments with an ten courses available in the fall of 1998. Examples of the courses, along with additional information on CLASS can be found at http://class.unl.edu.

Autobiographical Sketches

Kevin Smith is an Instruction Design Specialist for the Research and Development Unit in the Department of Distance Education, Division of Continuing Studies at the University of Nebraska-Lincoln. He has the responsibility of forming the course development teams and assisting with the course development process. Before coming to UNL, Mr. Smith taught high school mathematics at Columbus High School in Columbus, NE. He will receive his Masters degree in Instructional Technology from the University of Nebraska-Lincoln in the fall of 1998.

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